Limb Daily Ozone Product File Description

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1 Introduction

This document is a content and format description of the Ozone Mapping and Profiler Suite (OMPS) *[Flynn, 2007]* Limb Profiler daily ozone product, referred to as LP_DAILYO3. For information pertaining to the ozone retrieval algorithm, the reader should consult the OMPS Limb Porfiler Algorithm Theoretical Basis Document. For information on implementation details pertaining to a specific product version, the reader should consult that version's product release notes.

The LP_DAILYO3 product is a release version containing a subset of retrieval information available in the orbital LP_EDR_NASA data product. As of this writing, the orbital products are not released. In going from the orbital to the daily product here is no screening or averaging of data. The daily product is merely an aggregation of retrieval results over all orbits whose starting time is within a UTC calendar day.

The data are provided in the HDF5 format and grouped in five categories which are the Ancillary Data, the Data Fields, the Geolocation Fields, the Input Pointers and the info. The ozone profiles are combined of the retrievals from UV and Visible in both density and ppmv unit datasets together with estimated precision and the retrieved cloud height and surface reflectance.

2 File format

As described, the data are provided in the HDF5 format. The hdf5 library is required to read the files. This library is available from http://.hdfgroup.org. In addition to interfaces in C and Fortran which The HDF Group develops and distributes, there is a high quality interface for Python called H5py. These are all open sources.

In addition is also included in many common commercial data analysis tools: Matlab, IDL, TecPlot, Mathematica, etc.

The HDF5 file consists of named Groups (which behave like folders or directories in computer file system) and named datasets. Because the objects are named they can be accessed by name rather than by file offset.

3 Groups and Datasets

The LP_DAILYO3 data file consists of five groups (h5 space) respectively the AncillaryData, the DataFields, the GeolocationFields, the InputPointers and the info. Each group contains the datasets corresponding to the group category. The first three group datasets are briefed in following sections.

3.1 Ancillary Data

The Ancillary Data contains the atmosphere pressure profile, the atmosphere temperature profile, the terrain altitude and the tropopause altitude datasets. The externally obtained temperature and pressure profiles (see release notes for details) are interpolated in space and

time to the 80 OMPS tangent points for use in the retrievals. Tropopause altitude is also extracted from the external data. Figure 1 shows the contents of this group using the HDFView TreeView, and the Table 1 briefs the dataset name, long name, unit and dimension of these four datasets.

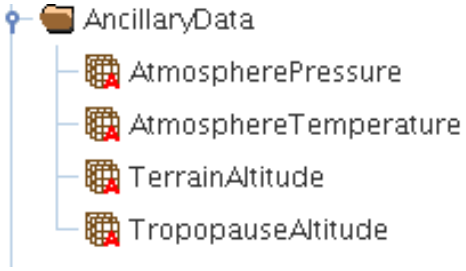

Figure 1. The Ancillary Data Group

Dataset name	**Long name**	**Unit**	**Dimension**
AtmospherePressure	Atmospheric pressure	hPa	(ntime, 81)
AtmosphereTemperature	Atmospheric temperature	C	(ntime, 81)
TerrainAltitude	Terrain altitude above mean sea level	km	(ntime,)
TropopauseAltitude	Tropopause altitude	km	(ntime,)

Table 1. The Ancillary data: dataset name, long name, unit and dimension.

3.2 Data Fields

The Data Fields contains the retrieved cloud height, the image (referred to as frame) number within each orbit, the combined ozone profile density/precision/quality, the combined ozone profile mixing ratio/precision/quality, the combined ozone profile vertical height resolution (FWHM), the data quality flag, and the derived surface reflectance.

The reported ozone precision is the estimated standard deviation derived from the diagonal of the covariance matrix of Rogers' Optimal Estimation solution. The ozone profile mixing ratio is calculated from the density profile using the temperature and pressure profiles reported in the ancillary data group.

The surface reflectance is the effective surface reflectance which includes the existing cloud (treated as at the terrain height). This is the retrieved mean value which is used for ozone profile retrievals. Figure 2 shows the capture of the TreeView with HDFView for Data Fields group, and Table 2 briefs these dataset names, long names, units and dimension.

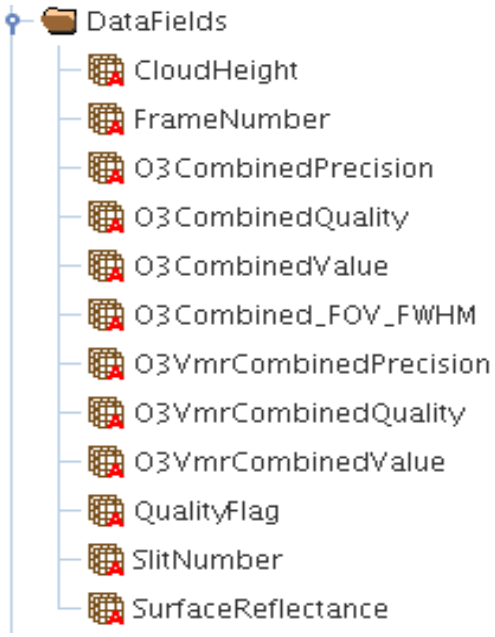

Figure 2. The Data Fields Group

Dataset name	**Long name**	**Unit**	**Dimension**
CloudHeight	Cloud height	km	(ntime,)
FrameNumber	Frame index ranging from 1 to total number of frames in the orbit	unitless	(ntime,)
O3CombinedPrecision	Uncertainty on combined ozone density	cm-3	(ntime, 81)
O3CombinedQuality	Quality flag for combined ozone density	unitless	(ntime,)
O3CombinedValue	Combined ozone density	cm-3	(ntime, 81)
O3Combined_FOV_FWHM	Combined ozone density profile resolution (FWHM) in height	km	(ntime, 81)
O3VmrCombinedPrecision	Uncertainty on combined ozone volume mixing ratio	ppmv	(ntime, 81)
O3VmrCombinedQuality	Quality flag for combined ozone volume mixing ratio	unitless	(ntime,)
O3VmrCombinedValue	Volume mixing ratio for combined ozone	ppmv	(ntime, 81)
QualityFlag	Flag for successfully completed retrievals (0) and for failed retrievals (1)	unitless	(ntime,)
SlitNumber	Slit index: 1 for left; 2 for center; 3 for right	unitless	(ntime,)
SurfaceReflectance	Mean surface reflectance	unitless	(ntime,)

Table 2. The Data Fields: Dataset name, Long name, Unit and Dimension.

3.3 Geolocation Fields

The Geolocation data group contains the date and time of the measurement, the orbit number, the height scale, the SAA flag, and the following evaluated at the 25 km tangent height: latitude and longitude, single scattering angle, and solar zenith angle. Figure 3 shows the capture of the TreeView of HDFView for Geolocation Fields group, and the Table 3 briefs these dataset names, long names, units and dimension.

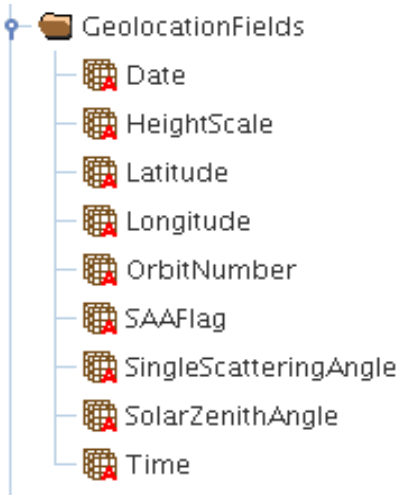

Figure 3. The Geolocation Fields Group

Dataset name	**Long name**	**Unit**	**Dimension**
Date	Date	YYYYMMDD	()
HeightScale	Reference height scale for retrievals	km	(81,)
Latitude	Mean latitude at tangent height of 25km	degrees	(ntime,)
Longitude	Mean longitude at tangent height of 25km	degrees	(ntime,)
OrbitNumber	Orbit number	Unitless	(ntime,)
SAAFlag	SAAFlag 0:outside SAA boundaries; 1:effect <5% of normal max; 2:effect 5%-40%; 3:>40%	unitless	(ntime,)
SingleScattering Angle	Mean single scattering angle at tangent height of 25km	degrees	(ntime,)
SolarZenithAngle	Mean solar zenith angle at tangent height of 25km	degrees	(ntime,)
Time	Seconds since midnight	seconds	(ntime,)

Table 3. The Geolocation Fields: Dataset name, Long name, Unit and Dimension.

3.4 Input Pointer and info

The Input Pointer and the info are the two remaining groups in the product file. The Input Pointer contains provenance information about data input to produce each specific LP_DAILYO3 file. The info dataset gives the version of the software used in processing.

4 Product Filenames

The product file name follows the pattern of sample below:

OMPS-NPP-LP_DAILYO3-v1.0-2012m0928-2012m1016t140007.h5
------Product name- ------- --DataDate-- -----Proc. Time------